Supplementary Information

Photocarriers-assisted photothermocatalysis of Fischer-Tropsch synthesis for enhanced yield of C2–C4 hydrocarbons over Co/$SrTiO_3$ catalyst

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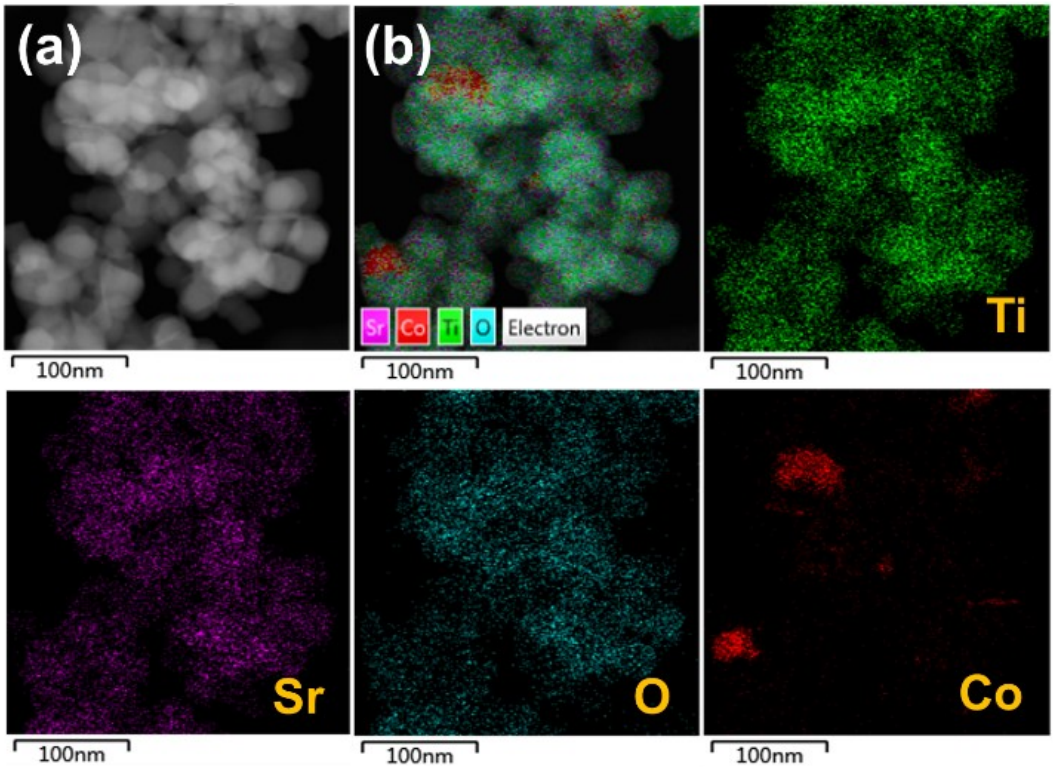

Fig. S1 (a) STEM image and (b) EDS mappings of Ti, Sr, O and Co elements.

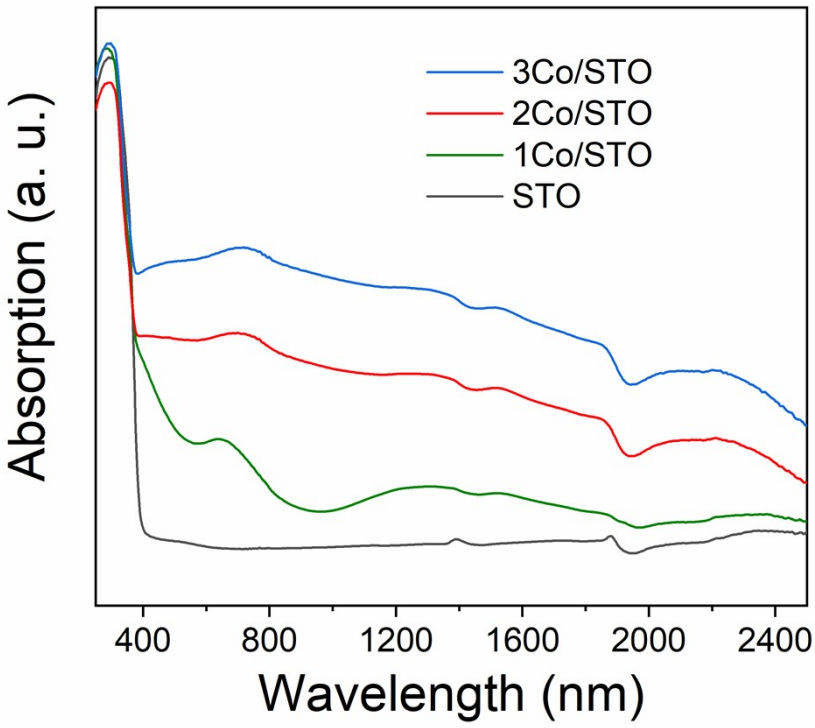

Fig. S2 UV-visible-IR spectra of the as-prepared catalysts.

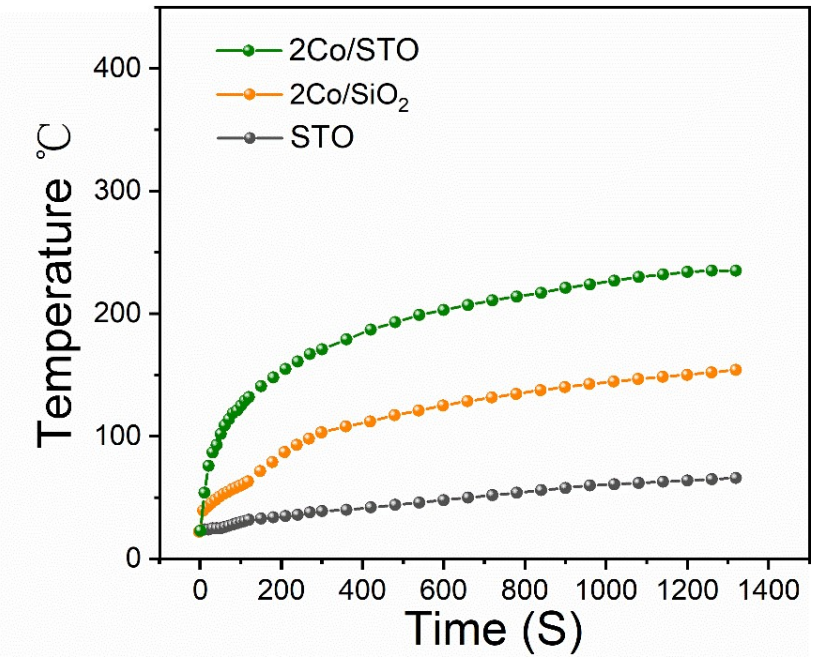

Fig. S3 Temperature monitoring of catalysts in the reaction.

Table S1 Performance comparison of various catalysts for CO conversion.

Catalysts	CO conversion (%)	CO_2 selectivity (%)	CH_4 selectivity (%)	$C_{2-4}^{=}$ selectivity (%)	C_{2-4}^{0} selectivity (%)	O/P= Olefin/Paraffin
STO	0.3	12.7	61.0	16.5	9.8	1.6
1Co/STO	8.4	79.3	12.9	7.7	4.1	1.9
2Co/STO	14.0	47.6	15.2	28.1	9.1	3.1
3Co/STO	15.2	47.2	21.7	19.7	12.4	1.6
2Co/SiO_2	3.6	73.4	22.5	1.5	2.6	0.6

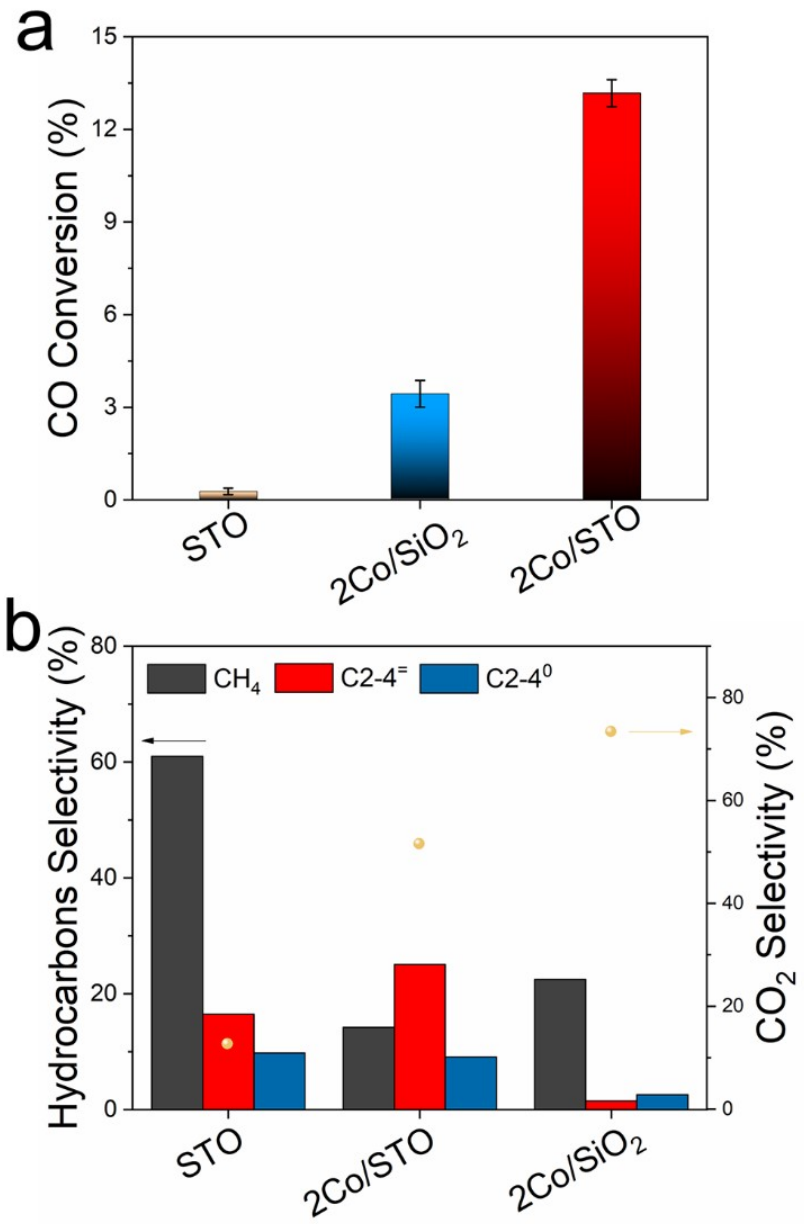

Fig. S4 (a) The CO conversion over as-synthesized catalysts; (b) The product selectivity of catalysts for CO hydrogenation under light irradiation (light intensity, ~ 6 suns).

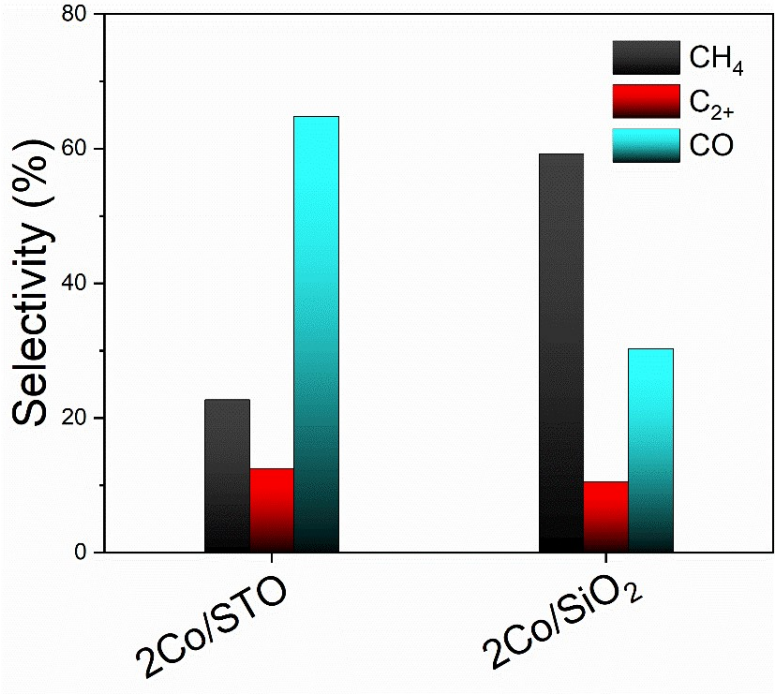

Fig. S5 The product selectivity of catalysts for CO_2 hydrogenation under light irradiation (light intensity, ~ 6 suns of 2Co/STO; ~ 10 suns of SiO_2).

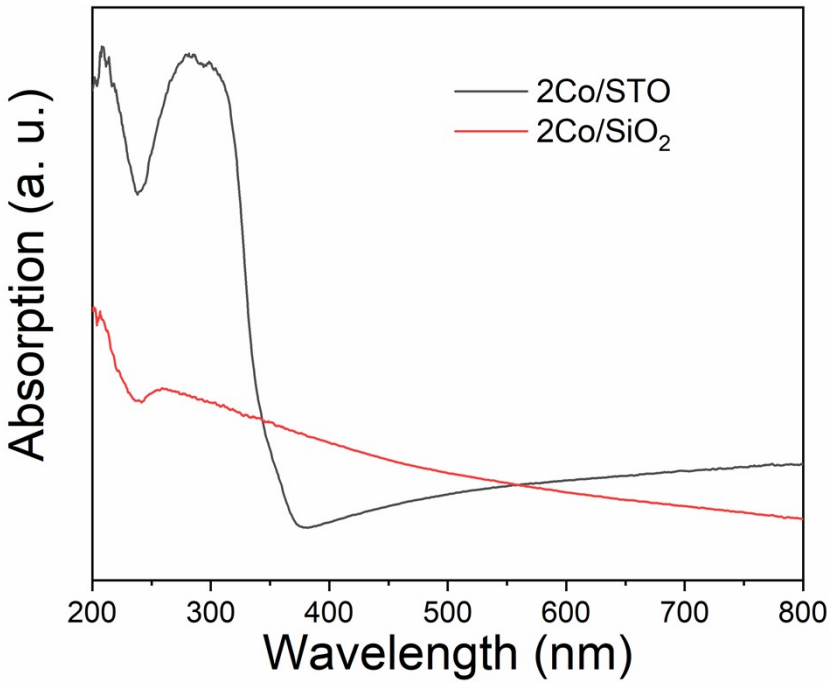

Fig. S6 UV-visible spectra of the as-prepared catalysts.

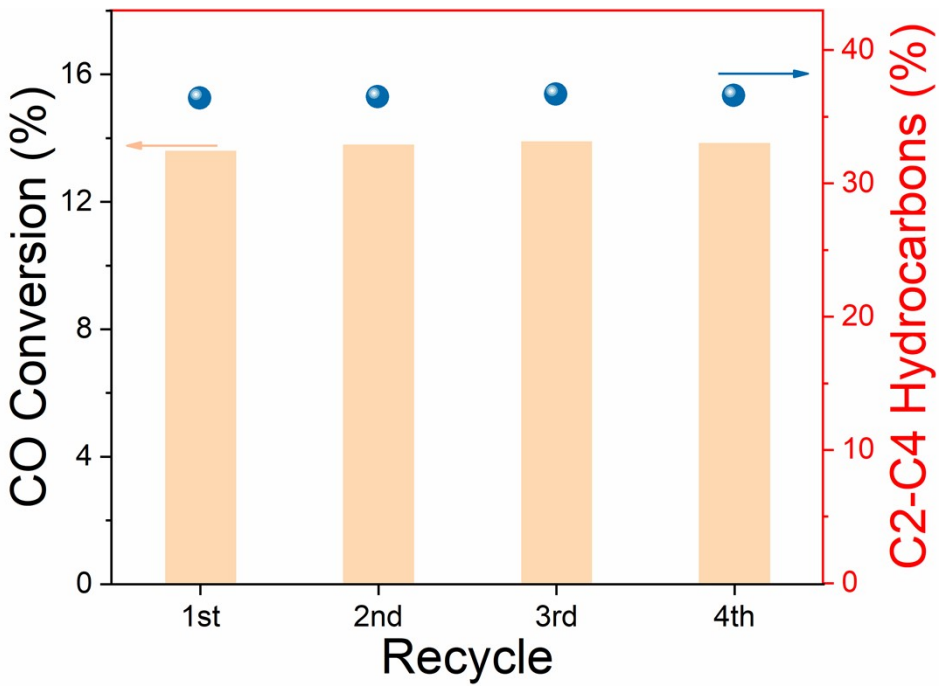

Fig. S7 The repeated light-driven catalysis of FTS for the 1.5Cu-2Co/STO catalyst.

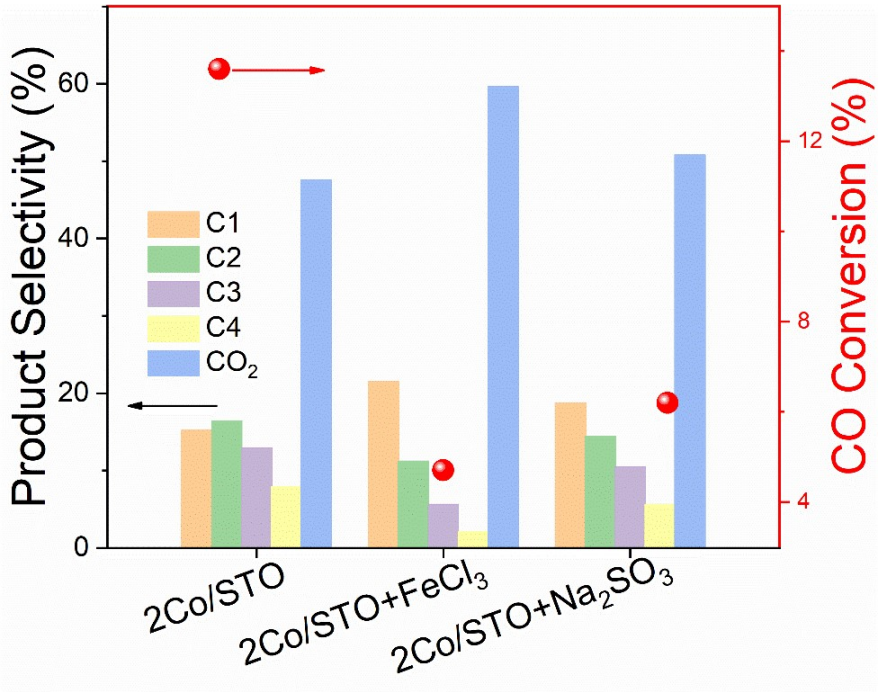

Fig. S8 The product selectivity of catalysts for CO hydrogenation under light irradiation with and without sacrificial agents ($FeCl_3$ and Na_2SO_3 were used for quenching photogenerated electrons and holes, respectively; loading amount, 5 wt. %).

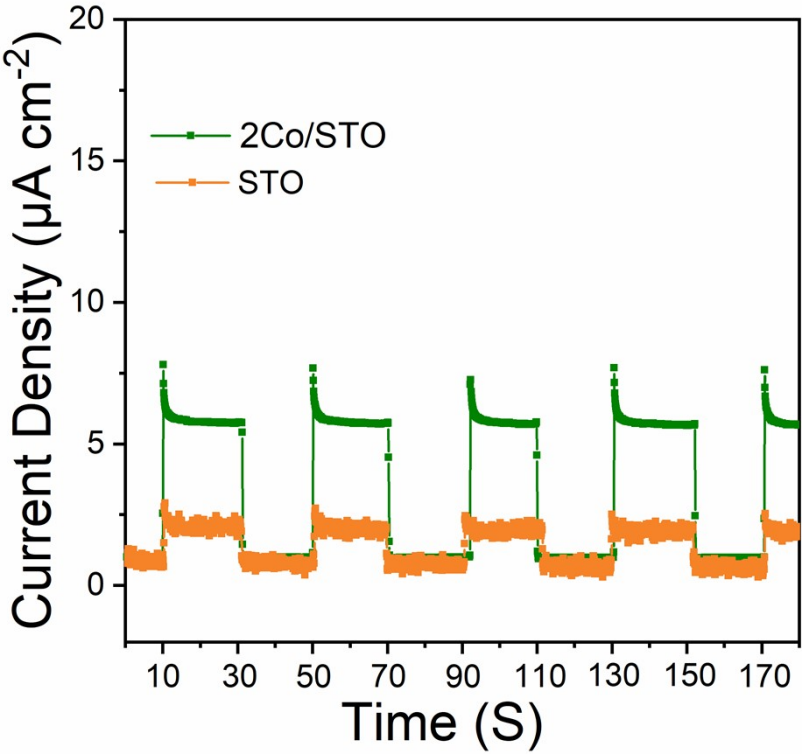

Fig. S9 Periodic on/off photocurrent response of catalysts.

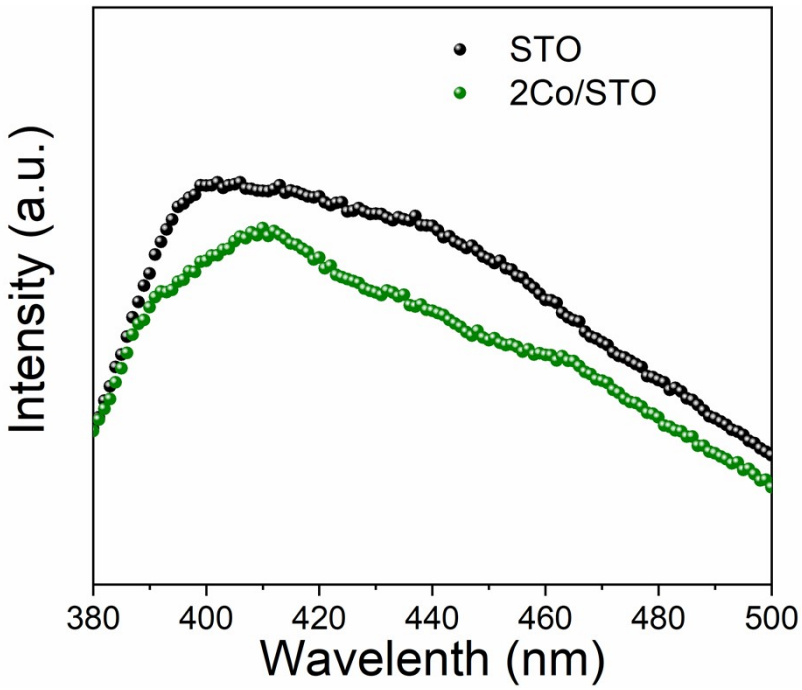

Fig. S10 PL spectra of the STO, 2Co/STO and 1.5Cu/2Co/STO catalysts, with an excitation wavelength of 350 nm.

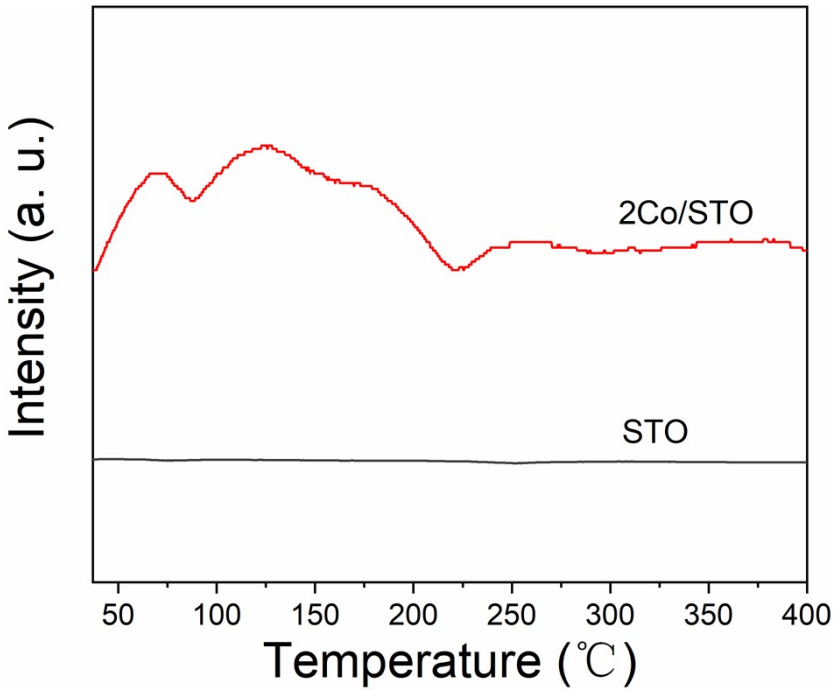

Fig. S11 Comparison of CO-TPR profiles of 2Co/STO and STO.